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# The role of taxes and transfers in reducing income inequality

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**Andrew Heisz and Brian Murphy  
Income Statistics Division, Statistics Canada**



# Introduction

- Canadian families receive income from market sources and government transfers, and pay income taxes.
  
- The amount by which the government sector reduces income inequality through the tax and transfer system is called “Income Redistribution”
  
- There has been a longstanding interest in understanding the role of income redistribution as a mitigating or corrective factor against rising market inequality.
  - Beach and Slotsve (1996)
  - Heisz (2007)
  - Frenette, Green and Milligan (2009)
  - Milligan (2013)
  - Davies (2013)



# Objectives

- Review the results on the effect of income redistribution on income inequality
- Add information on redistribution by tax and transfer program
- Emphasise the distinction between “redistribution” and “progressivity” in taxes and transfers



# Redistribution vs. Progressivity (1)

- “Redistribution” is the amount by which a particular tax or transfer reduces income inequality
  
- “Progressivity” is a measure of how much a tax or transfer differs from proportionality
  
- e.g.
  - A transfer that is targeted at lower incomes such as the Canada Child Tax Benefit
  
  - A tax that rises with income, such as the Personal Income Tax



## Redistribution vs. Progressivity (2)

- The amount of redistribution generated by a tax or transfer depends upon its progressivity and its average (tax or benefit) rate
  - Intuitively, for two equal sized taxes or transfers (in terms of the average tax or transfer rate), the more progressive tax or transfer would have a larger redistributive effect
- Separate indicators for redistribution and progressivity would provide analysts and policy makers additional tools indices by which to evaluate the effect of changes in the tax and transfer system on income inequality



# Methods (1)

Kesselman and Cheung (2006)

Total redistribution (R) is the absolute difference in pre- and post- redistribution GINI coefficients (Musgrave and Thin (1948) and Reynolds and Smolensky (1977))

$$R = G_M - G_{AT} \quad (1)$$

Separate redistribution indices for taxes (subscript t) and transfers (subscript b) can be described as:

$$R_t = G_T - G_{AT} \quad (2) \text{ and}$$

$$R_b = G_M - G_T \quad (3).$$

Where:

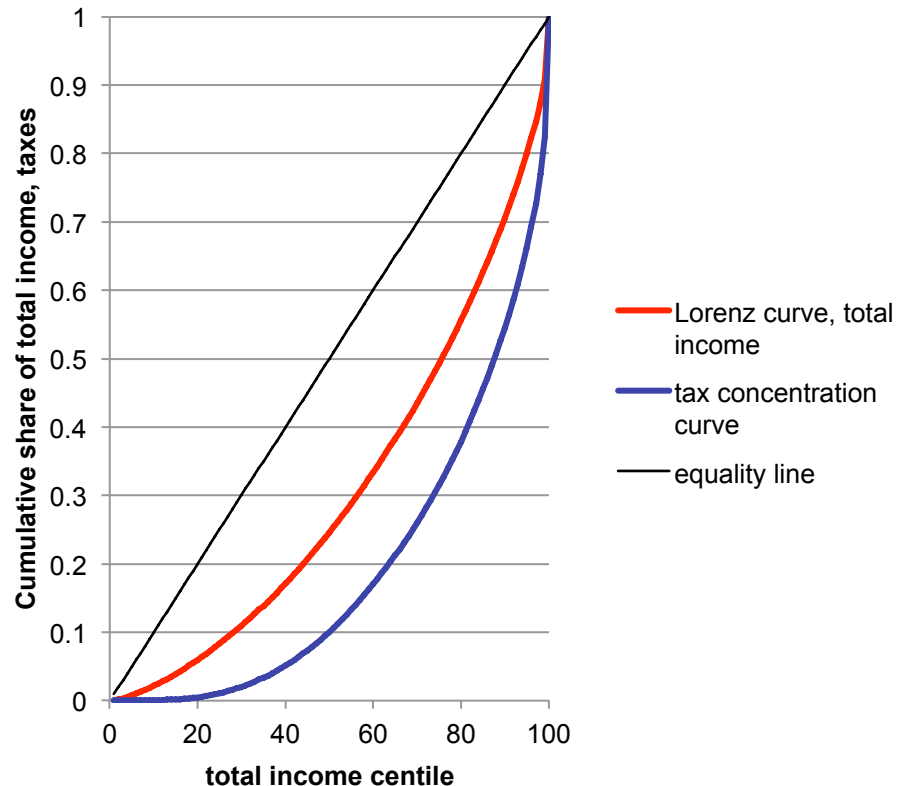
$G_M$  is the GINI of market income

$G_T$  is the GINI of total income

$G_{AT}$  is the GINI of after-tax income

## Methods (2)

- Progressivity index: Kakwani (1977, 1984)
- Tax concentration curve: the cumulative share of taxes paid, by income rank
- if a tax were proportional, the concentration curve of taxes would lie on top of the Lorenz curve of pre-tax income
- the concentration curve of a progressive tax would lie outside the Lorenz curve
- Tax concentration index ( $C_t$ ): twice the area between the tax concentration curve and the equality line
- twice the area between the Lorenz curve and the tax concentration curve is the Kakwani index of tax progressivity ( $P_t$ )
- $P_t = C_t - G_T$



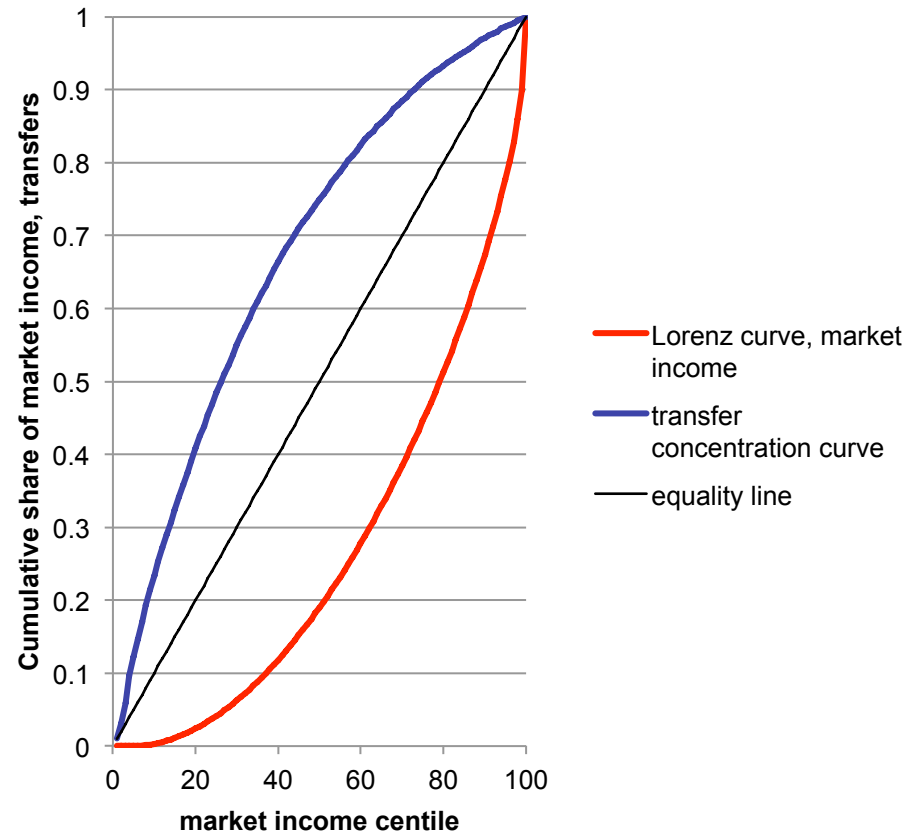
## Methods (3)

•Likewise, twice the area between the Lorenz curve of pre-transfer income and the transfer concentration curve provides an index of transfer progressivity (Lambert 1985)

$$P_b = G_M - C_b$$

Where

- Transfer progressivity ( $P_b$ )
- Concentration index of transfers ( $C_b$ )





## Methods (4)

taxes

$$R_t \cong \frac{t}{1-t} P_t \quad (5)$$

$$t = \frac{\sum \text{taxes}}{\sum \text{total income}} \quad (6)$$

transfers

$$R_b \cong \frac{b}{1+b} P_b \quad (8)$$

$$b = \frac{\sum \text{transfers}}{\sum \text{market income}} \quad (9)$$

- equations (5) and (8) are approximate
- the method can be used for total taxes or transfers, or individual taxes or transfers
- Speaks to the issue of “targeting” programs through raising progressivity and program size (through average tax/transfer rates)



# Data

## 1976-to-1997 Survey of Consumer Finances (SCF) and the 1993-to-2010 Survey of Labour and Income Dynamics (SLID)

- Market income
  1. Earnings
  2. Net Self employment income
  3. Asset income
- Transfers:
  1. C/QPP,
  2. OAS/GIS,
  3. Child Benefits (FA, CTC, CTB, WIS, CCTB, NCBS, UCCB)
  4. Social Assistance (SA)
  5. Employment insurance (EI)
  6. Other transfers (Workers compensation, WITB, provincial tax credits, others)
- Taxes
  1. Provincial and federal personal income taxes

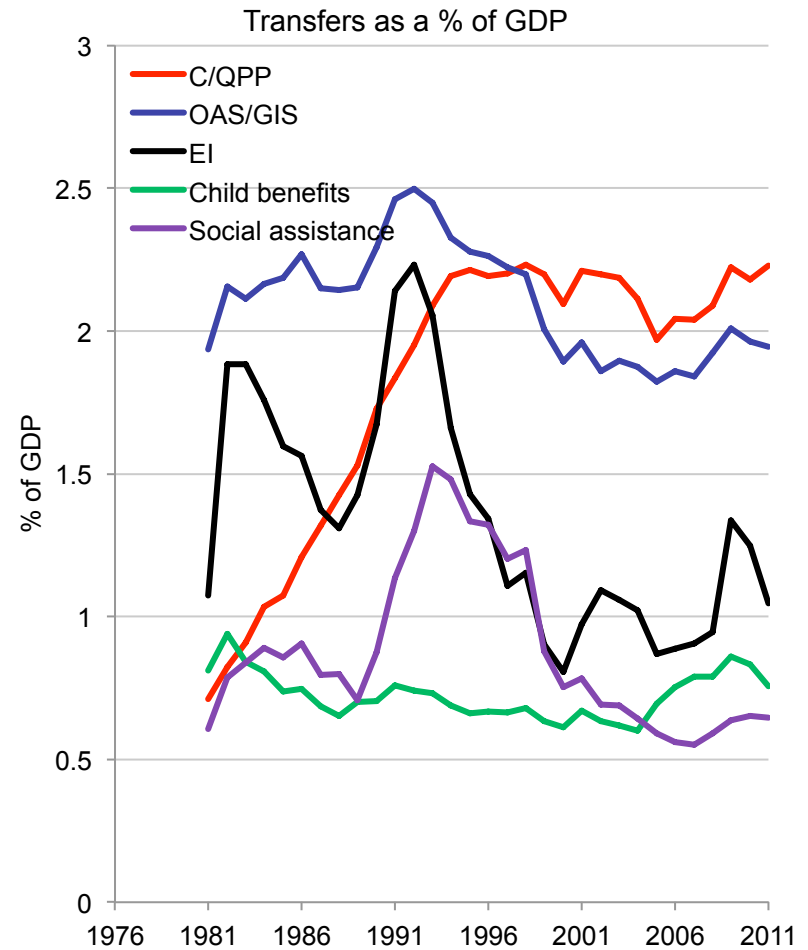
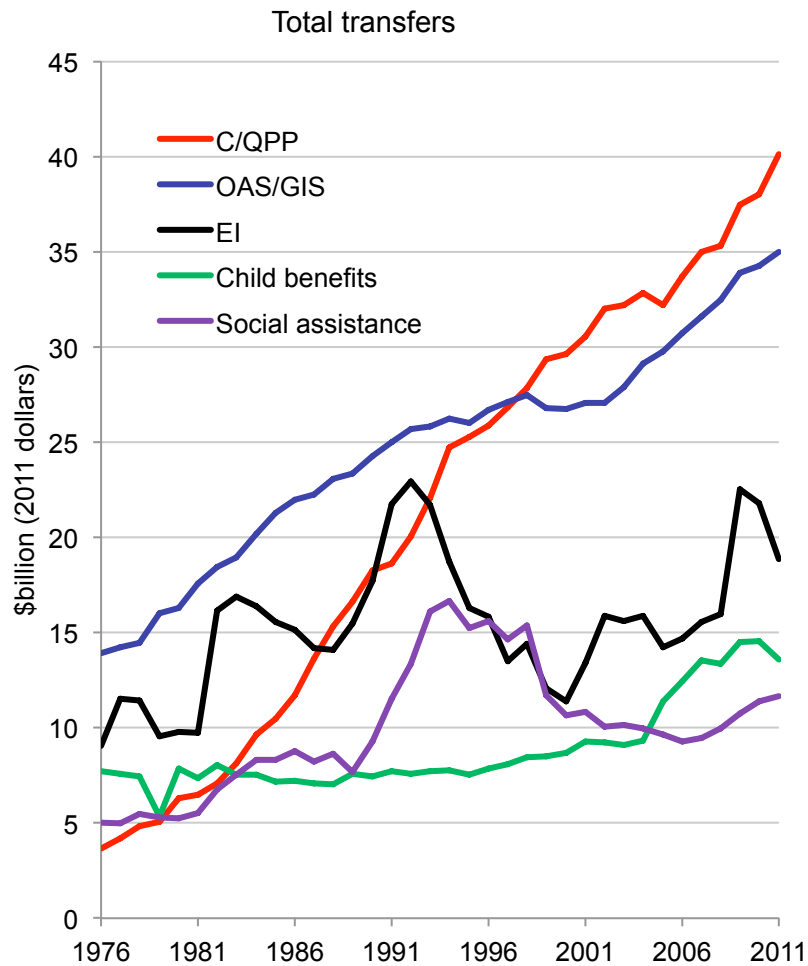
– Does not include payroll taxes, consumption taxes, property taxes.

## Social Policy Simulation Database and Model (SPSD/M)

- Used to test sensitivity, model payroll taxes

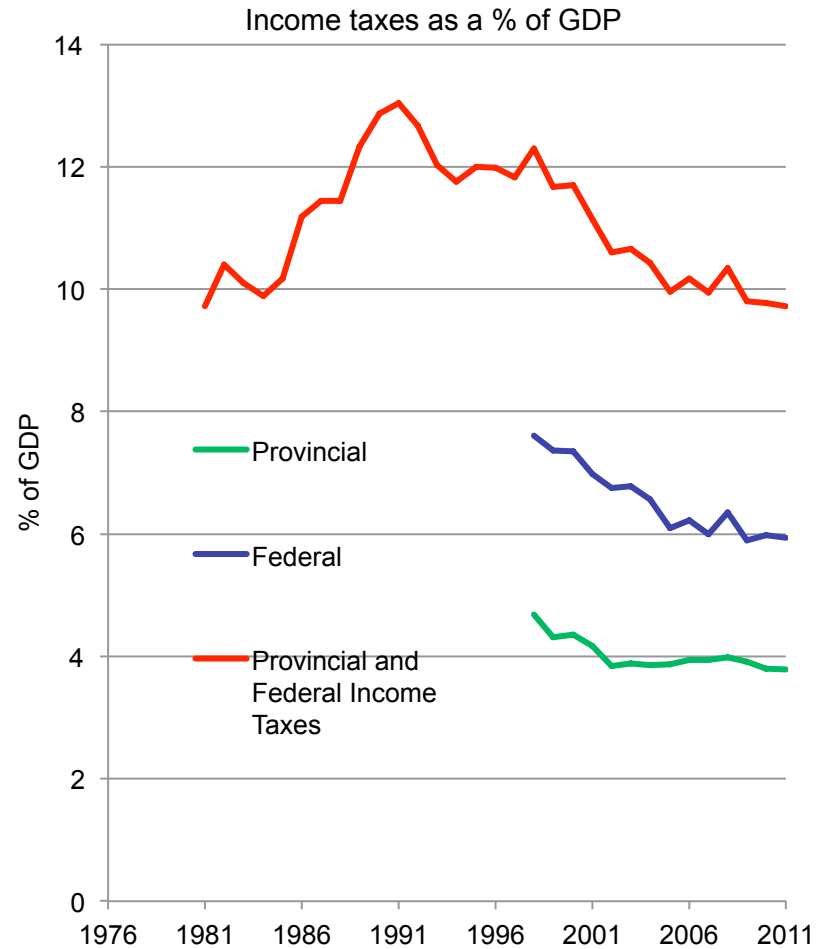
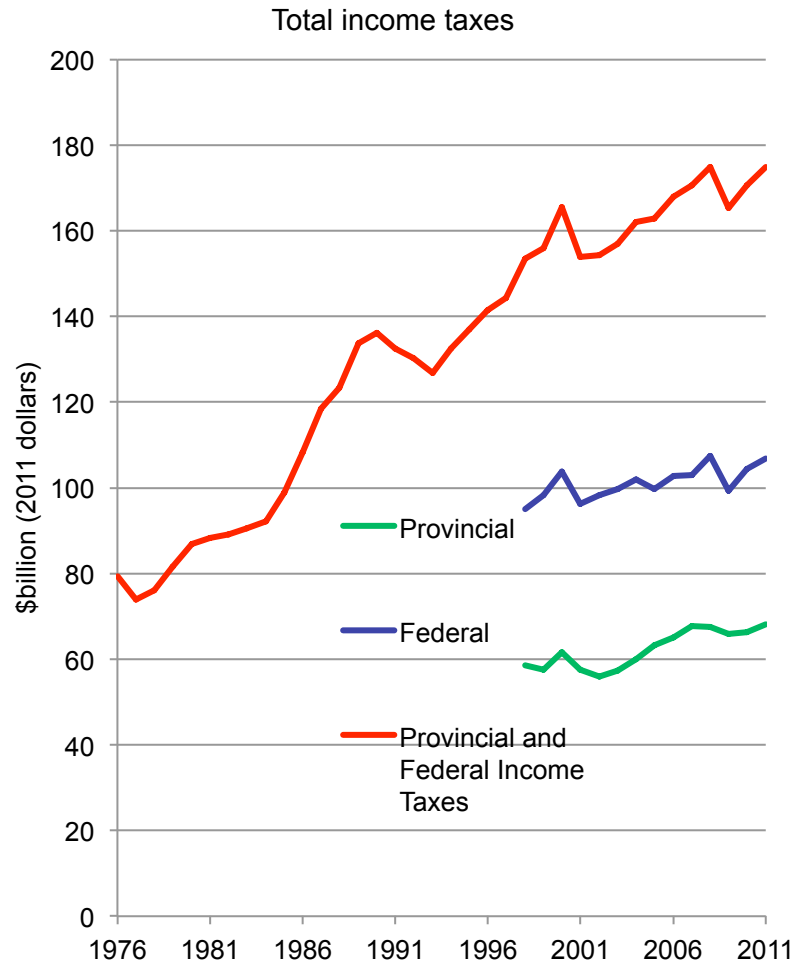


# Relative sizes of transfers





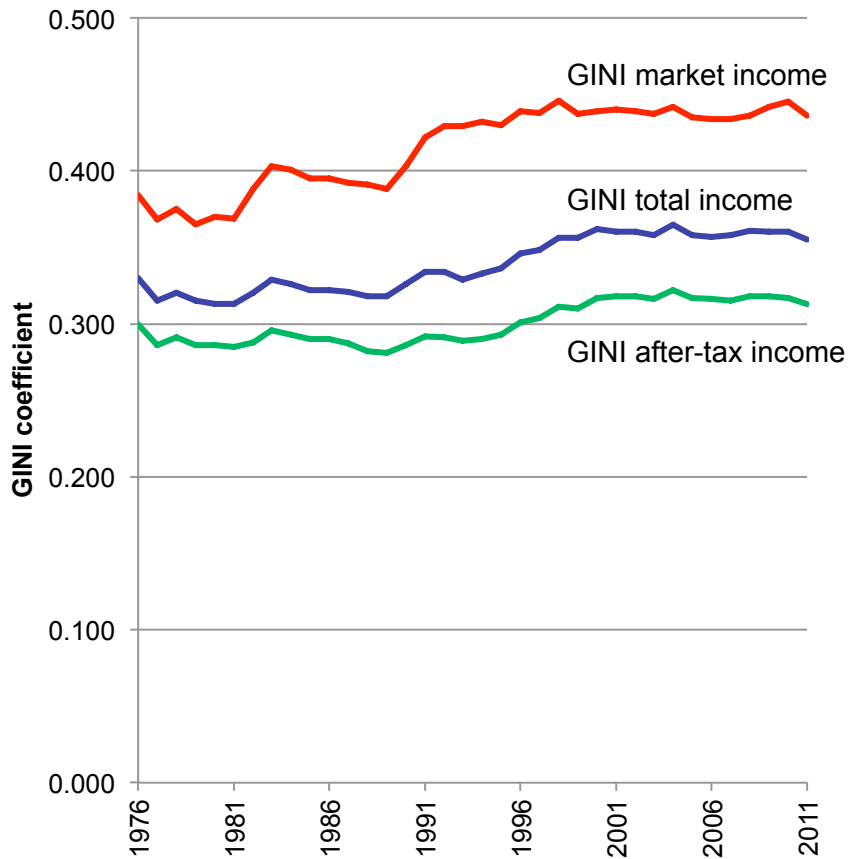
# Relative sizes of taxes



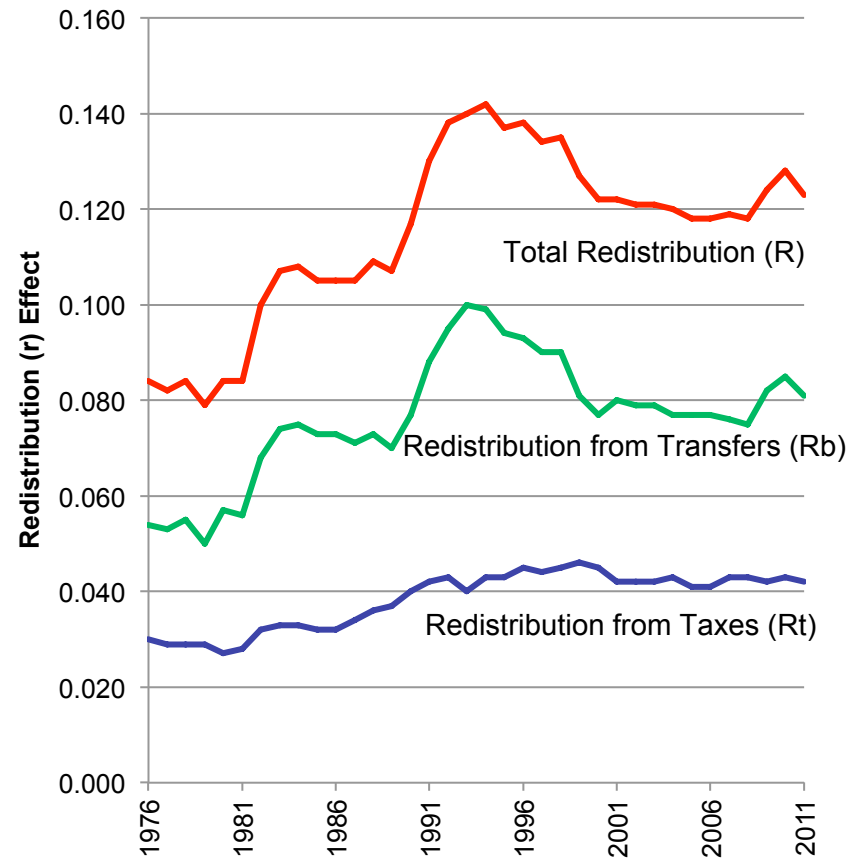


# Redistributive effect of taxes and transfers

GINI coefficients, Market, Total and After-tax Income



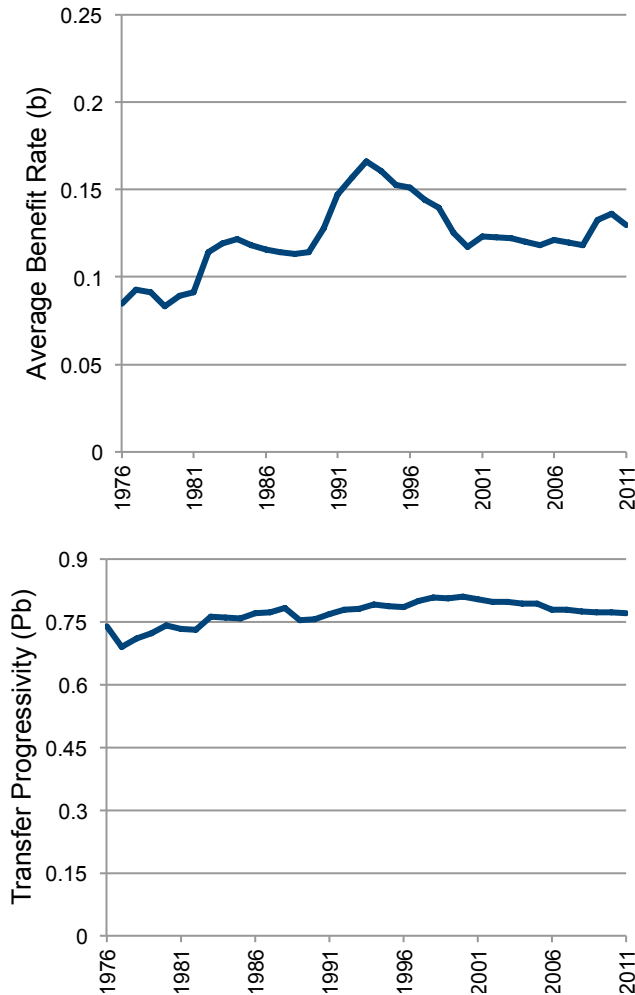
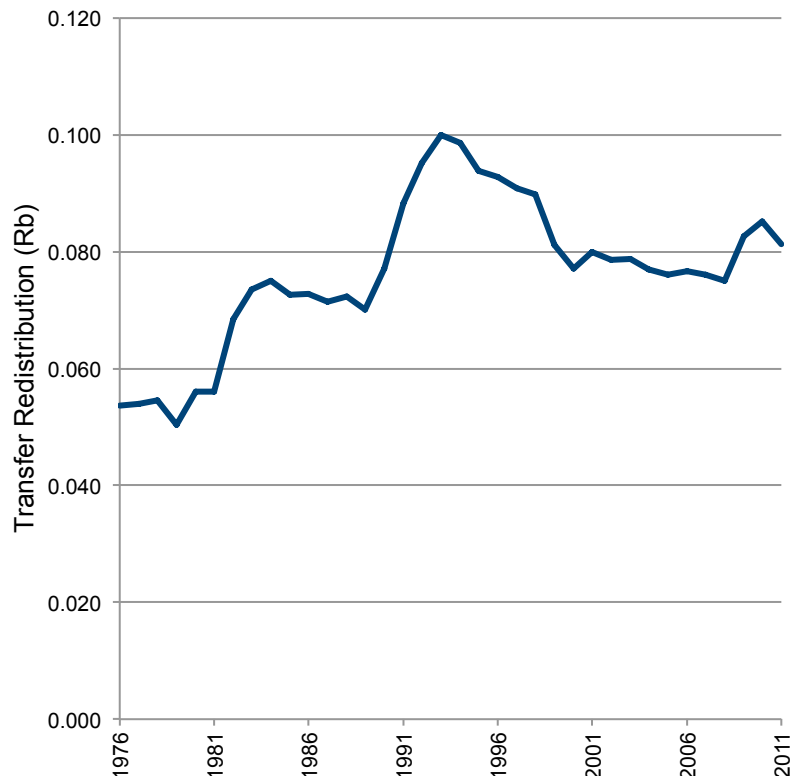
Redistribution (R) estimates, transfers, taxes and total redistribution





# Decomposing transfer redistribution into average benefit rate and transfer progressivity

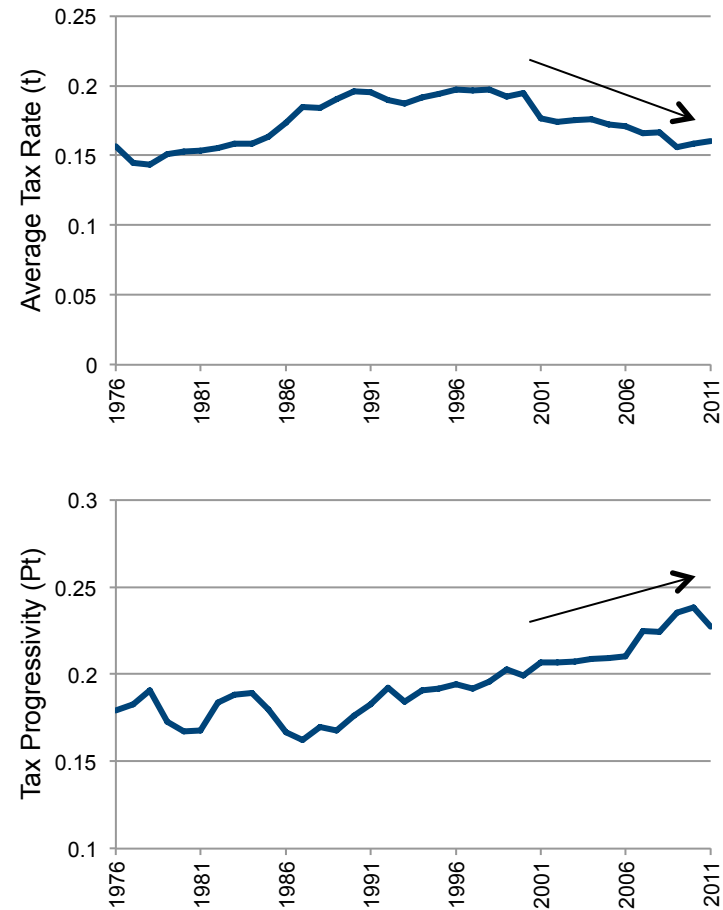
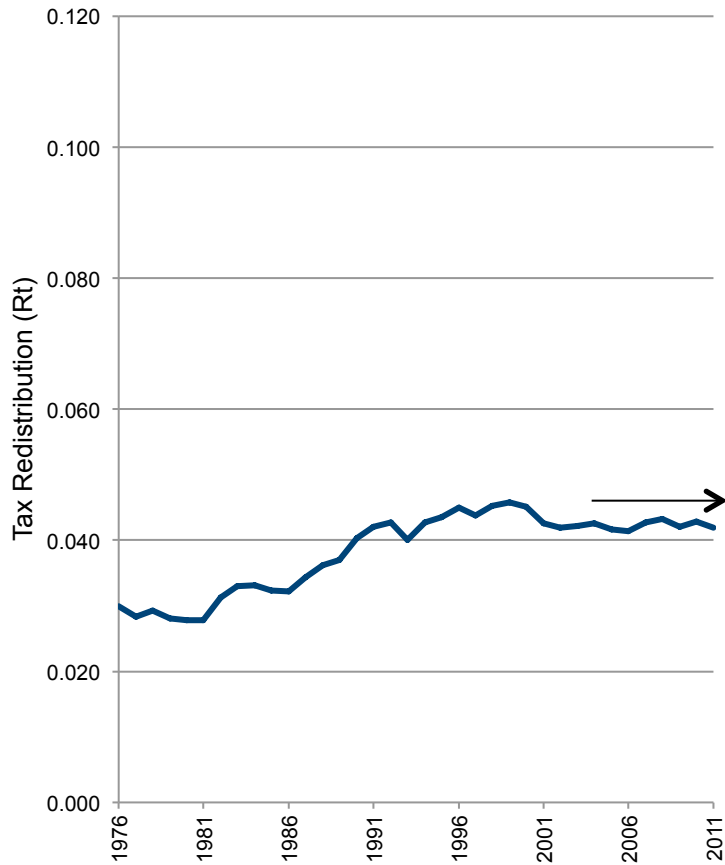
$$R_b \cong \frac{b}{1+b} P_b$$





# Decomposing tax redistribution into average tax rate and tax progressivity

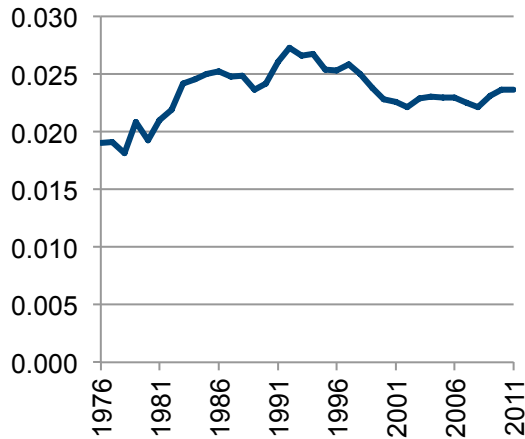
$$R_t \cong \frac{t}{1-t} P_t$$



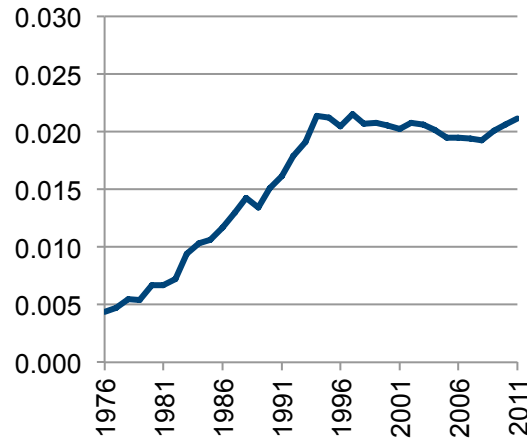


# Redistribution from transfers (Rb)

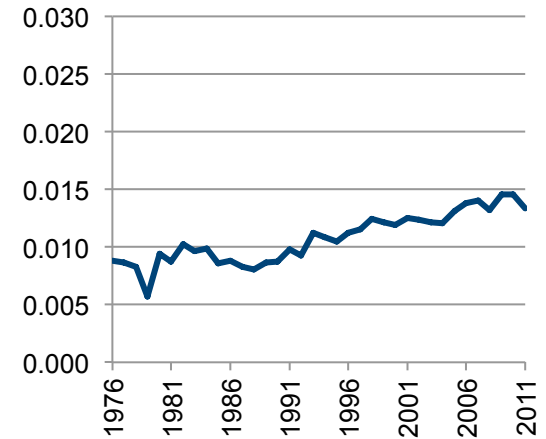
### OAS/GIS



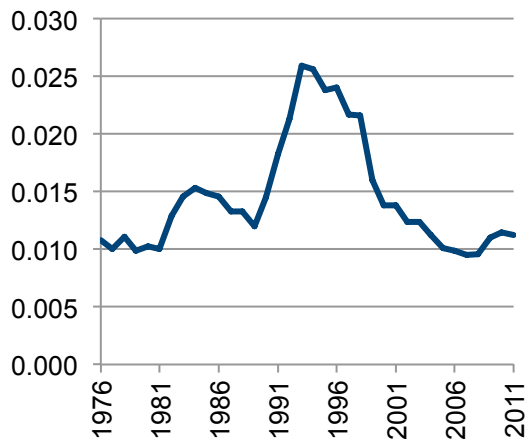
### C/QPP



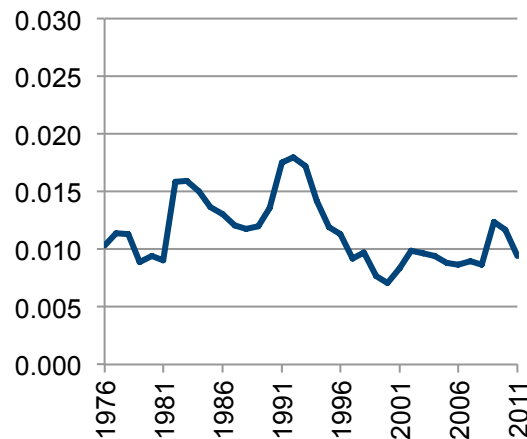
### Child Benefits



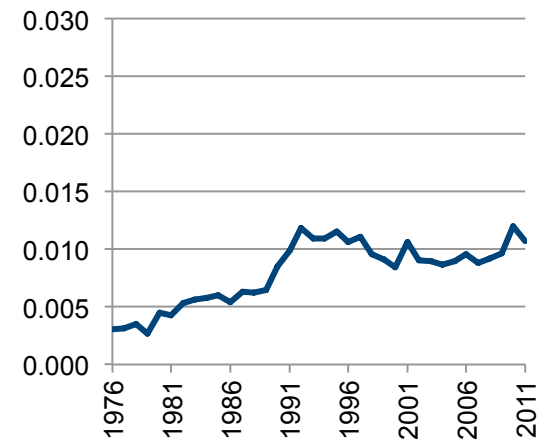
### Social Assistance



### EI



### Other Transfers

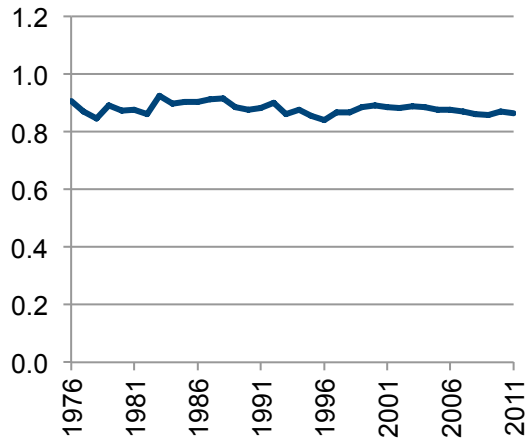




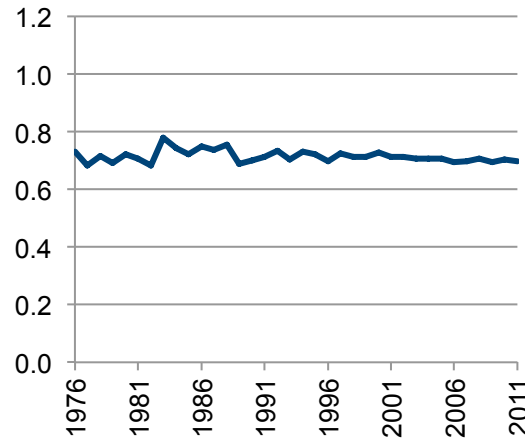


# Progressivity indices of transfers (Pb)

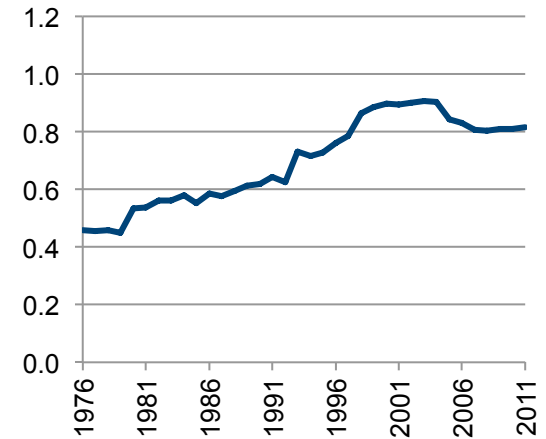
## OAS/GIS



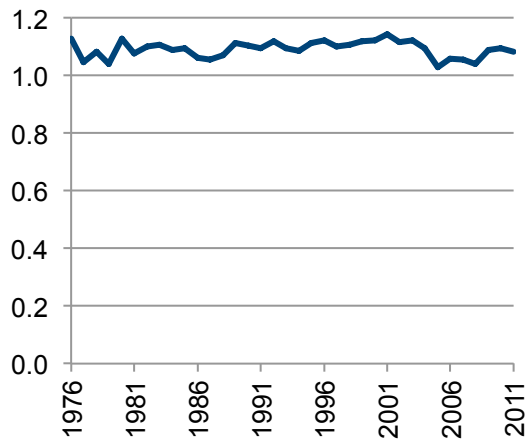
## C/QPP



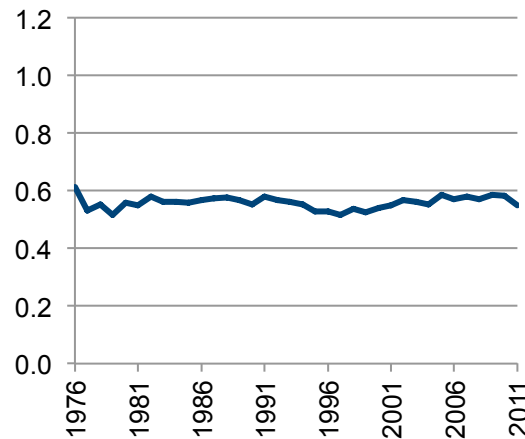
## Child Benefits



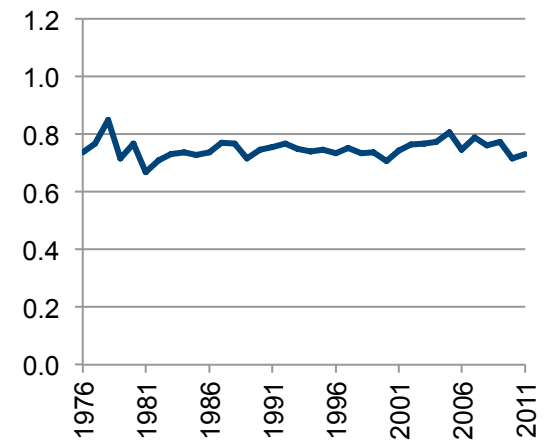
## Social Assistance



## EI



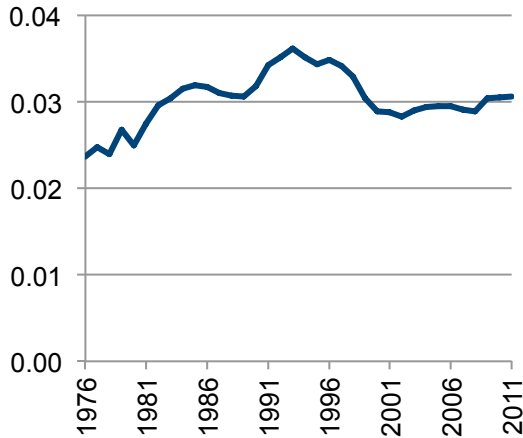
## Other Transfers



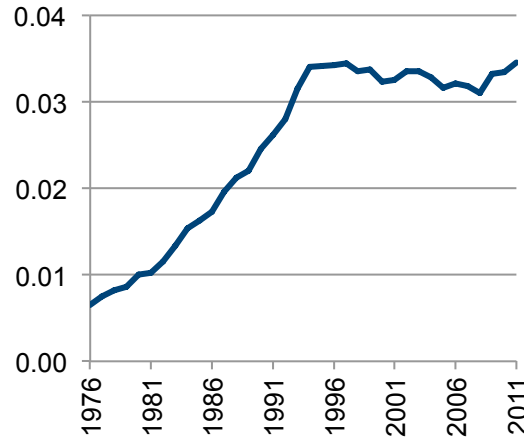


# Average transfer rate (b)

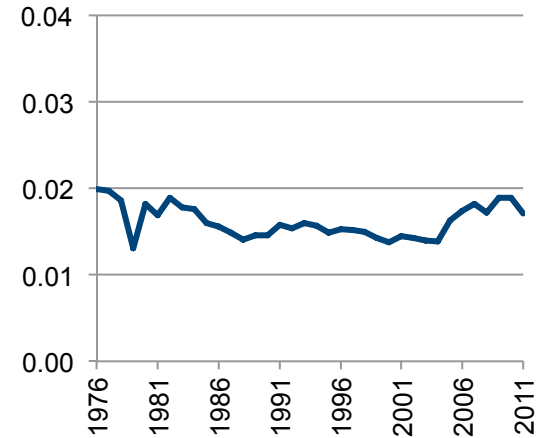
### OAS/GIS



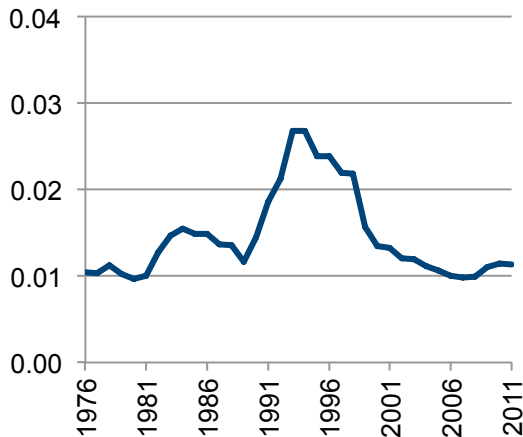
### C/QPP



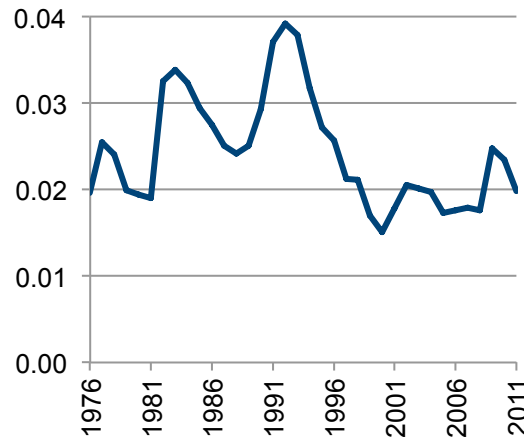
### Child Benefits



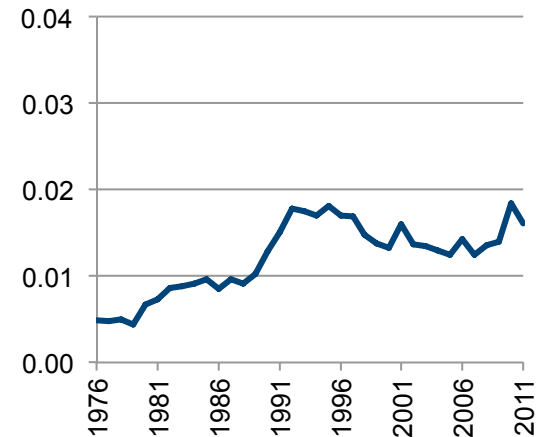
### Social Assistance



### EI



### Other Transfers



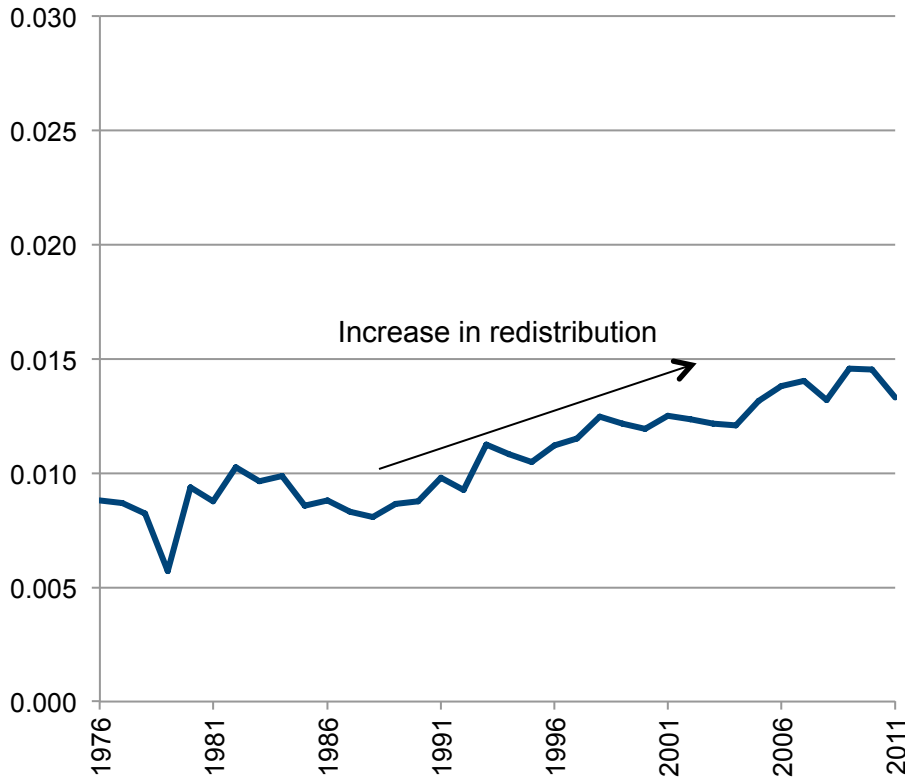
b= total benefits / total market income



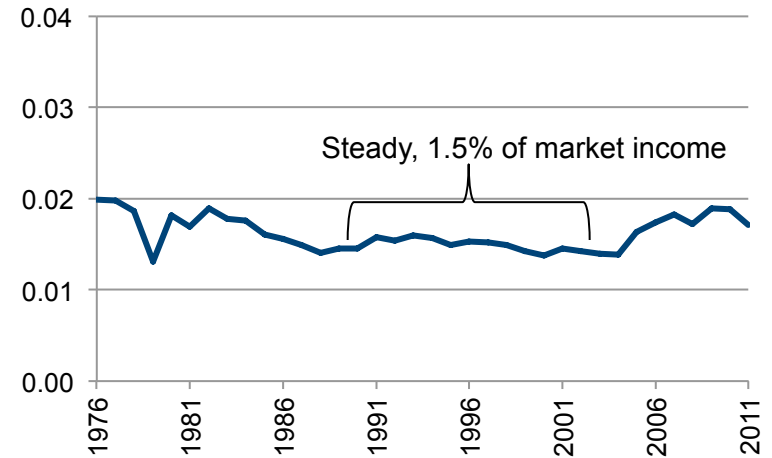
# Child Benefits: Over Time

$$R_b \cong \frac{b}{1+b} P_b$$

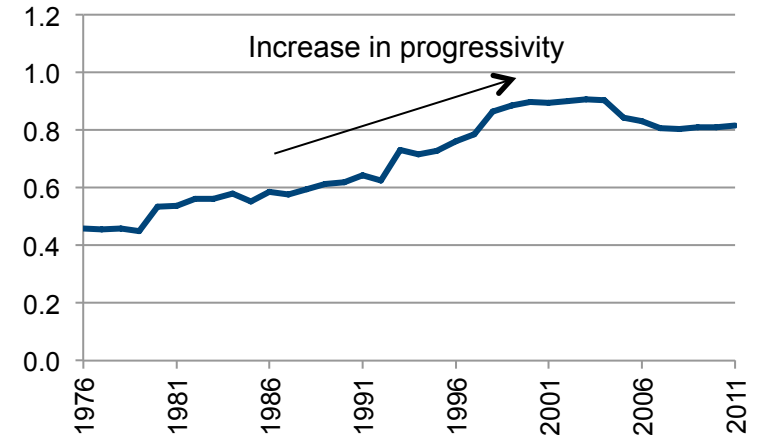
### Redistribution (Rb)



### Average Transfer Rate (b)



### Progressivity (Pb)





## Child Benefits: Across Programs

Redistribution from child benefits, 2011

|                                   | Average benefit rate (b) | Progressivity (Pb) | Redistribution (Rb) |
|-----------------------------------|--------------------------|--------------------|---------------------|
| Canada child tax benefit          | 0.015                    | 0.836              | 0.012               |
| National child benefit supplement | 0.008                    | 1.183              | 0.009               |
| Universal child care benefit      | 0.008                    | 0.519              | 0.004               |
| families with children only       |                          |                    |                     |

- while the UCCB and NCBS were of similar size in 2011, the NCBS was more progressively distributed, yielding a greater reduction in inequality



## Results in the paper but not the presentation

1. Results for the Working Income Tax Benefit:
  - The WITB had a high progressivity index, ranking between the CCTB and NCBS
  - The size of the program is comparatively small, and thus it reduces inequality by less.
  
2. How did tax progressivity rise while the average income tax rate fell?  
Average tax rates fell faster at the bottom of the income distribution
  
3. Results including payroll taxes: payroll taxes are regressive, and reduce the overall progressivity of the tax system, but do not change total redistribution by very much
  
4. Other sensitivity tests:
  1. Ordering of individual transfers
  2. Estimates of progressivity holding underlying population constant

# Conclusion

## 1. Reviewed results on income redistribution

- increases in market income inequality that occurred during the 1980s and 1990s recessions were completely offset by a tax and transfer system which became more redistributive, such that there was no increase in after-tax income inequality up to 1995
- during the second half of the 1990s, the tax and transfer system became somewhat less redistributive, and after-tax income inequality increased
- A recent rise in market income inequality (2009-2010) was offset by rising transfer redistribution

## 2. Presented statistics on redistribution by transfer program

- 1980s and early 1990s rise in redistribution associated with a growth in redistribution across several transfer programs
- late 1990s decline mainly associated with declines in SA and EI redistribution

## 3. Presented indicators for describing redistribution and progressivity that would have applications in policy development and evaluation

- how redistribution through taxes has remained high despite falling tax rates
- where a given sized intervention through the tax and transfer system would yield the greatest redistributive effect



## Working Income Tax Benefit

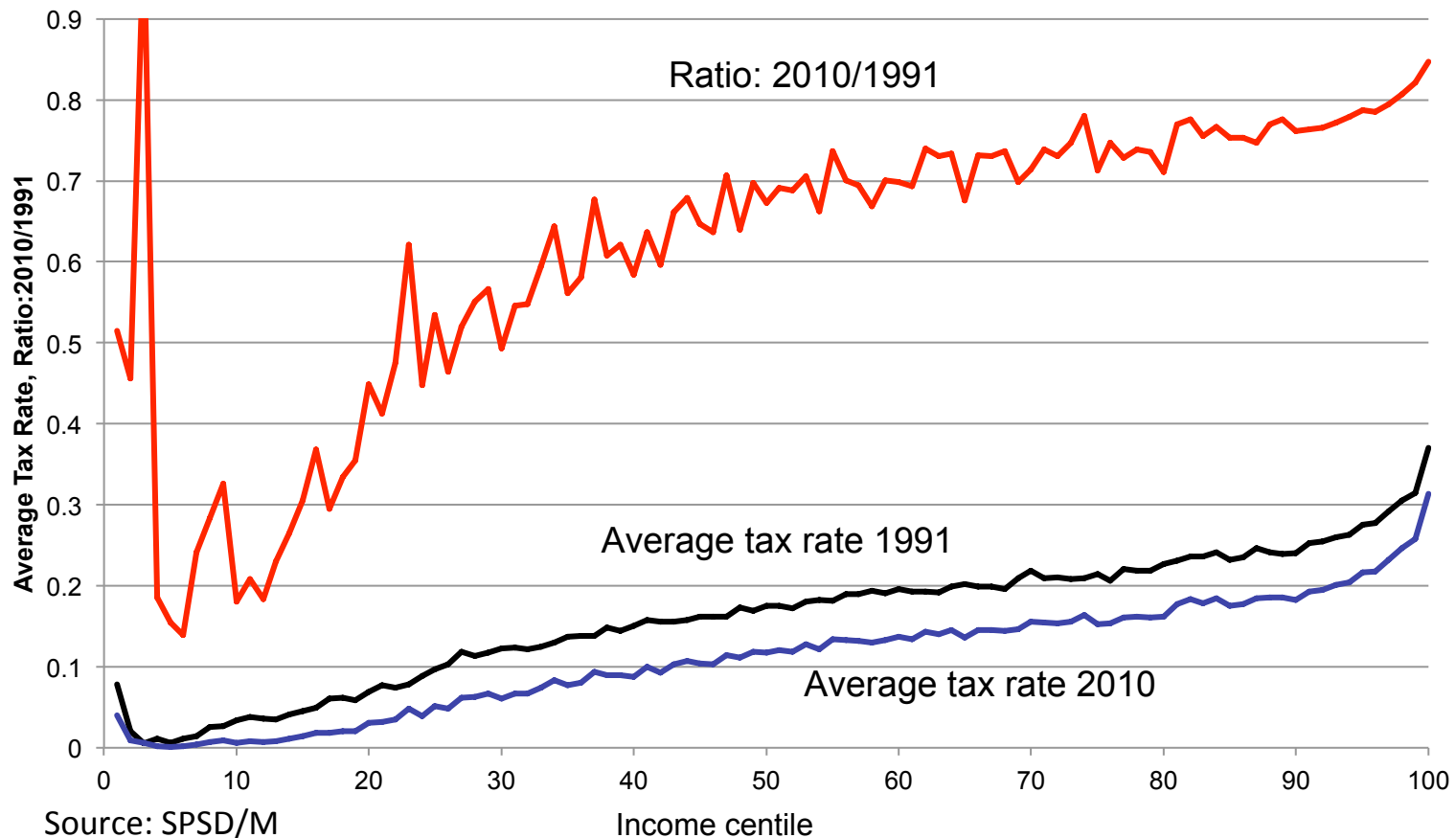
Redistribution from WITB, 2011

|   | Average benefit rate (b) | Progressivity (Pb) | Redistribution (Rb) |
|---|--------------------------|--------------------|---------------------|
| Canada child tax benefit<br>families with children only | 0.001                    | 0.915              | 0.001               |

- The WITB had a high progressivity index, ranking between the CCTB and NCBS
- The size of the program is comparatively small, and thus it reduces inequality by less.



# Understanding how progressivity rose while the average income tax rate fell: Rates fell faster at the bottom of the income distribution







## Adding in Payroll taxes: Payroll taxes are regressive, but do not affect overall redistribution very much

| Redistribution from different taxes, 2011, Modeled                     |                         |                         |                          |
|--|-------------------------|-------------------------|--------------------------|
|  | Average tax rate<br>(t) | Progressivity ( $P_t$ ) | Redistribution ( $R_t$ ) |
| Federal income tax   | 0.100                   | 0.240                   | 0.026                    |
| Provincial income tax  | 0.062                   | 0.223                   | 0.014                    |
| Federal plus<br>provincial taxes                                       | 0.162                   | 0.233                   | 0.044                    |
| Federal payroll tax  | 0.033                   | -0.059                  | -0.002                   |
| Federal and<br>provincial income<br>taxes and federal<br>payroll taxes | 0.195                   | 0.184                   | 0.043                    |
| Source: SPSD/M   |                         |                         |                          |